ANALYSIS OF ONE HUNDRED AND THREE CASES OF EXUDATIVE NEURO-RETINITIS, ASSOCIATED WITH CHRONIC BRIGHT'S DISEASE.

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IN presenting to the consideration of the Society some points in the course, duration and prognosis of so-called Neuro-Retinitis Albuminurica, which have seemed to the writer to be of some interest, it should be stated that only such cases have been considered as were originally examined by the writer himself, and which he had been able to follow to their termination. All cases of renal disease with retinal complications, which were due to scarlatina or pregnancy, were rigidly excluded. Out of a total number of somewhat more than five hundred cases examined, I have been able to follow up to the present time only one hundred and three (103) cases, or about one fifth of the whole number; the remaining four fifths, or about eighty per cent., having disappeared from view. The observation of these one hundred and three cases covers a period of time of thirteen years and six months. In every case the ophthalmoscopic examination was made by myself, while the visual acuity and visual field were measured by competent assistants. The urine of each patient was examined both chemically and microscopically by myself. Where it was possible to do so, the entire amount of urine passed in the twenty-four hours was tested as to reaction, specific gravity, color, amount of albumen and sugar, and the presence of casts, and the results were carefully tabulated. The heart was carefully examined in every case; and where one examination was not perfectly satisfactory, a second one was always made.

The period of duration of the retinal inflammation, as indicated by the symptoms complained of by the patients, varied in the hundred and three cases between three days and three years, but in many cases of considerable chronicity the patients were unable to set any exact period for the beginning of the failure of vision. In the large majority of cases both eyes were affected when the patient first came under observation, though by no means always in the same degree, there being in many cases a marked difference in the two eyes.

The period of duration of the renal disease, as indicated by the occurrence of the symptoms, was very difficult to determine. In fifty-six (56) cases, or more than fifty per cent., it was entirely unknown. In forty-seven (47) cases, or somewhat less than fifty per cent., it varied from six months to several years.

The sex of the patients was nearly evenly divided between males and females, fifty-six being men and forty-seven being women.

The age of the patients varied between five years and seventy-eight years.

The vision ranged between $\frac{20}{20}$ and zero. It was improved by constitutional and local means in thirty-two cases, or about 31.5 per cent.; but this was mainly due to an improvement in the renal disease and in the general health, and was not permanent; for as the disease in the kidneys reasserted itself and the general health failed, fresh exudation, or hæmorrhages, or both occurred in the retina, and vision again deteriorated.

Uræmic amblyopia, or transient attacks of more or less complete blindness in one or both eyes, occurred in thirty-seven (37) cases; but in all of these cases retinitis or neuro-retinitis was present.

Both eyes were affected at the time of examination in fifty-four (54) cases, and both eyes became affected while the patients were under observation in ninety-three (93) cases. The *right* eye was first affected in twenty-seven (27) cases, and the *left* eye was first affected in twenty-two (22) cases.

The retina alone was inflamed in both eyes in eighty (80) cases. In the *right* eye alone the retina was inflamed in

eleven (11) cases, and in the *left* eye alone in twelve (12) cases.

The optic nerve and retina were inflamed in both eyes in about twenty-five (25) per cent. of the cases. They were both inflamed in the *right* eye alone in sixteen (16) cases, and in the *left* eye alone in thirteen (13) cases.

Hæmorrhages occurred in both eyes in forty-six (46) cases. They occurred in the *right* eye alone in eleven (11) cases, and in the *left* eye alone in twelve (12) cases. In thirty-four (34) cases there were no hæmorrhages. In thirty (30) of these thirty-four (34) cases there was hypertrophy of the left side of the heart, while in the sixty-nine (69) cases in which hæmorrhages occurred, there were five (5) in which there was no cardiac disease demonstrable.

Hypertrophy of the left side of the heart, *without* valvular disease, occurred in seventy-nine (79) cases. There was hypertrophy of the left side of the heart *with* valvular disease in sixteen (16) cases. In eight (8) cases there was no cardiac disease at the time of the first examination, though hypertrophy of the left side subsequently developed in all but three (3) cases.

In many of the cases examined there were visible in the retina the white lines along the arteries, which constitutes the so-called vascular hypertrophy, so well described by all writers on this subject. But in many of the cases, even those in which the heart was hypertrophied, no such change was to be seen in the retinal arteries as we are accustomed to designate by the name of perivasculitis retinæ.

I have not been fortunate enough to examine any case early enough in the course of the retinal disease to see it in what Leber calls its first stage, or that of marked retinal and papillary hyperæmia, accompanied by an œdematous infiltration; though I have seen the œdema in what Leber would call the second stage, accompanied by the yellowish fatty degeneration. Here it is certainly due to increased vascular tension, for it varied with the state of the circulation and was susceptible of recovery. In this second stage, I have seen the margin of the papilla alone infiltrated, with the centre not in-

volved, and with more or less space between the infiltrated papillary margin and the yellowish exudation in the region of the macula. In a few cases I have seen a pure papillitis, resembling the "choked disc" met with in intracranial tumor, without any exudation into the retina; but if such cases be kept under observation long enough, the retinal exudation in and about the macula will be sure to occur, though not necessarily in the stellate form, supposed to be typical of the disease. The yellowish exudation regarded as marking the second stage I believe to be entirely independent of the occurrence of hæmorrhages, having no connection with either their number or size. This exudation, which marks the fatty change dependent on arterial degeneration, is now generally regarded as an index of chronicity in the renal disease, and by some as the issue, direct or indirect, of the increased arterial tension which loss of renal function in many shapes may entail. It seldom occurs independently of renal fibrosis, and almost never without being preceded by hypertrophy of the left side of the heart. It seems now to be a generally accepted view by pathologists that the cardiac hypertrophy is not caused by the arterial thickening, but results in common with it from the capillary obstruction; for this idea seems to be proved by the frequent development of cardiac hypertrophy before corresponding changes are noted in the arteries, and also by the general absence of cardiac alteration in lardaceous disease, where the arteries, though not affected in the same way, are as much thickened and apparently as obstructed as in other forms of albuminuria. But though these vascular changes occur so constantly in the kidneys and some other organs of the body, they are by no means always met with in the retina. Though the ophthalmoscopic picture of white lines along the retinal arteries is very often seen in these cases of exudative neuro-retinitis, there were many of them which showed no such visible proof of the hypertrophy of the muscular and fibrous coats, and a consequent diminution of the vascular calibre. In these cases, if the vascular coats were thickened, the hypertrophy was not extensive enough to admit of being seen by the enlargement produced by the ophthalmoscopic

image, and however constantly this vascular change may be associated with hypertrophy of the left ventricle in other parts of the body, it is not so with the retinal vessels.

As regards the retinal hæmorrhages, it is no doubt true that their occurrence is intimately connected with a diseased condition of the blood-vessels. They almost always occur suddenly and are apt to affect both eyes, though not necessarily simultaneously, and by no means commonly symmetrically. Cases have been reported in which they caused extensive scotomata; but I have met with but three such cases. In one case, where the left eye was first affected, there was a large hæmorrhage at the macula which extended well over towards the margin of the optic disc, and here an examination of the field showed an irregular central scotoma of an average diameter of 20°. In another case, also of the left eye, there was a small central scotoma corresponding to a hæmorrhage which covered the entire macula. In a third case, in which both eyes were affected, there was a large hæmorrhage in the region of the macula in both eyes, and a corresponding irregular central scotoma in the field of each eye.

A single instance of colored vision occurred among the whole number. The patient, a woman, who had suffered from Bright's disease for three years, who had both hypertrophy and valvular disease of the heart, and in whom both eyes showed the typical form of neuro-retinitis albuminurica, complained constantly of erythropsia, and said that everything appeared as if seen through red smoke. In this case there were no retinal hæmorrhages.

The third stage of the retinal process, as described by Leber, or that of retrograde metamorphosis of the retinal exudation, is worthy of close and continued observation.

In the thirty-two (32) cases in which the vision improved for a time, while the patient was under constitutional treatment, there was in all a perceptible change in the appearance of the fundus, which in some cases was very marked. There was in all a complete disappearance of the œdematous infiltration of the retina and disc, and in some a perceptible absorption of the yellow exudation in the retina around the

macula and between it and the optic disc. But I have never in any case seen any signs of absorption in the peculiar glistening stellate exudation at the macula, even in those cases in which the improvement of vision was most marked. Leber refers particularly to the absorption of the exudation which takes place in those cases of renal disease which are cured, or which are brought to a stand-still; but I very much doubt whether any case of chronic interstitial nephritis, which has lasted long enough to cause cardiac hypertrophy and neuro-retinitis, is ever cured. I do not remember ever to have seen a case in which the retinal exudation was entirely re-absorbed. The retrograde metamorphosis I believe to be always an incomplete process, and though the exudative process may remain for a time quiescent, I believe that in the great majority of cases, if not in all, this state of partial metamorphosis is always followed by a recurrence of the inflammatory process in the retina and fresh exudation, dependent indirectly on an exacerbation of the renal disease, through the medium of fresh cardio-vascular changes. In the more unfavorable cases, where both retinitis and neuritis have been marked, another and still more unfavorable change occurs. As the immediate inflammatory symptoms subside, and the œdema of the optic disc and retina disappears, the papilla regains more or less completely its regularly defined outline, and in some cases even may become as sharply defined as normal; but instead of retaining the greyish- or whitish-yellow hue of inflammation, or of regaining the rosy-gray hue of health, it becomes discolored, grows more and more white, and finally assumes the appearance of atrophy following a neuritis descendens. The arteries become diminished in calibre and begin to show white lines along their walls, and these changes become more and more marked as time elapses, and we have then to deal with a hopelessly atrophic papilla.

An examination of these one hundred and three cases with special reference to the duration of life, has impressed me very strongly with the extremely unfavorable prognosis to be made, and with the comparatively short lease of life which these patients still possess. Of the one hundred and three

cases examined, extending over a period of thirteen years and six months, eighty-six have died and seventeen are still living. Of the eighty-six (86) who have died, fifty-seven (57) died within the first year; eighteen (18) within the second year; six (6) within the third year; four (4) within the fourth year; and one within the sixth year. Of the fifty-seven (57) who died within the first year, thirty (30) died within six months. One died within ten days of the first examination; one in three weeks; eight within two months; six within three months; seven within four months; three within five months; four within six months; three within seven months; six within eight months; four within nine months; three within ten months; one within eleven months; ten within twelve months; two within fourteen months; one within fifteen months; one within sixteen months; three within eighteen months; one within twenty months; ten within twenty-four months; six within three years; four within the fourth year; and one within the sixth year.

Of the seventeen (17) patients who are still living, fourteen (14) were seen for the first time within the last six months, and in all but one of these fourteen, the renal disease had probably lasted a considerable time. Two of those still living were first seen within the past year, and one of the seventeen was first seen seven years ago and has been examined at intervals since. In this last case the stellate exudation at the macula still continues unchanged, but although there has been but little change of vision for several years, the renal disease is still present, as shown by the urine and certain head symptoms. It will thus be seen that of the one hundred and three (103) patients examined, fifty-seven or more than fifty per cent. died within the first year, and thirty of these died within the first six months; a fatality which is not only marked, but for a chronic disease unusually rapid.

A rather unusual complication was observed in four cases in the presence in the urine of sugar as well as albumen. In one of these cases, both eyes were affected, the right eye much more than the left eye, and there was cardiac hypertrophy. The amount of sugar varied with every examination that was

made of the urine, and was never large. The patient died in eight months. The second case, in which both eyes were affected, showed also a varying amount of sugar, as well as albumen and casts. This patient also died in eight months. In both these cases there were retinal hæmorrhages. The third case, in which both eyes were affected, showed considerable sugar from the beginning, but it disappeared from the urine before the death of the patient, which occurred in fourteen months. The fourth case, in which both eyes were affected, showed a small amount of sugar at first, which has varied in quantity at different times. This patient is still living. There were no retinal hæmorrhages in either of these last two cases.

DISCUSSION.

DR. NORRIS.—I have seen many cases of retinitis albuminurica and I agree with Dr. Bull that it is very rare, in fact never occurs, to have all the macular changes disappear in cases of chronic disease of the kidney. There are almost always traces of fatty degeneration in the neighborhood of the macula to be seen months afterward, even if vision has become good.

DR. CARMALT.—Can Dr. Bull form any estimate as to the time of death as between the presence of hæmorrhage or simply of fatty white spots?

DR. BULL.—I have not been able to form any prognosis from the occurrence of hæmorrhage.

DR. GRUENING.—This subject has been frequently discussed in the New York Ophthalmological Society. At one of the last meetings I stated my experience, which in the main agrees with that of Dr. Bull. I had collated all my cases (more than one hundred), and I found that none of these cases lived more than two years after the diagnosis of retinitis albuminurica had been made. I speak only of those cases in which the typical stellate changes were seen in the maculæ of both eyes. Since reporting these cases, I have seen these changes confined to the macula of one eye. There is no evidence of Bright's disease in that case. Dr. Agnew saw this case with me. That is the first time that I have seen this change in the macula without disease of the kidney.

DR. LITTLE.—I would ask Dr. Bull if the diminution of the conditions in the retina were any indication of a favorable prognosis?

DR. BULL.—I regard it as having no bearing.

DR. FRYER.—I would ask if in these cases albumen was ever absent from the urine, and if so, if any examinations were made for albuminose? I have noted in two cases that while albumen was absent from the urine, albuminose was present.

DR. BULL.—Albumen was absent quite often, but no examinations were made for the detection of albuminose.

DR. WEBSTER.—I am quite satisfied that, in very rare instances, these patients do recover their general health so as to live almost indefinitely. I remember a clergyman who called at our office some years ago. He had what any one would recognize as a typical picture of retinitis Brightii. He informed me that Dr. Prout, of Brooklyn, had examined his eyes ten or fifteen years previously and recognized the condition. He also had found albumen and casts, and had given an unfavorable prognosis. He was, however, still living and preaching. I had the urine examined and found a slight trace of albumen.

DR. HAY.—I wish to make an additional communication with reference to the case which I reported three or four years ago, in which there was ecchymosis of the conjunctiva and a swelling of the fundus supposed to be sarcomatous. It turned out to be a simple hæmorrhage between the choroid and sclerotic. The patient died suddenly six months later from apoplexy. The urine which was drawn before or shortly after death was loaded with albumen. There was no appearance of albuminuric retinitis.

DR. WADSWORTH.—I agree with Dr. Bull in regard to the general persistence of the stellate spots in the macula, but more than once I have seen such spots disappear entirely. This has been in cases of albuminuric retinitis which came on during pregnancy or immediately after. I recall one case in which the changes were very marked and vision was reduced to counting of fingers at a short distance. There were quite large, brilliant white spots. The albuminuria occurred with the first pregnancy. The patient recovered so completely, that in two or three years there was absolutely no sign to be made out in either eye, except pallor of the disk and some narrowing of the vessels. Vision was very fair. She had been confined a second time without any unpleasant symptoms.

I have also seen typical stellate deposits in cases of cerebral

tumor and in cases supposed to be meningitis, in which there was no albuminuria.

DR. GRUENING.—I wish to add that the cases of retinitis Brightii which we see in our offices differ from those which we see in the hospital. During the past seven years, I have examined all the cases of Bright's disease associated with eye trouble which have been admitted to the Mt. Sinai and the German Hospitals, and I find many of the patients entirely blind. Such patients we do not see in our offices. In these cases, we find marked retinal degeneration. I might also say that in a discussion which was held in one of the Vienna societies, the oculists maintained that these changes occur only with the small contracted kidney, because patients who have this kidney come to the office of the oculist. The patients with the large white kidney do not come to the office of the oculist, but find their way to the hospital. In the hospital we frequently find the large white kidney, while in private practice it is generally the contracted kidney,

DR. BULL.—In regard to the point raised by Dr. Wadsworth, I stated in the beginning of my paper that all cases of albuminuric retinitis due to scarlet fever or pregnancy were excluded. I have repeatedly seen in such cases, the deposits completely absorbed and vision restored to normal.

With reference to the case referred to by Dr. Gruening in which the exudation was confined to one eye, I am very sure, from my experience, that if the case is watched the exudation will be found to appear in the other eye.

I do not wish to be understood as by any means endorsing the statement that the so called exudation in the region of the macula is typical of Bright's disease. I have seen it in cases of undoubted intra-cranial tumor and in cases supposed to be meningitis. Retinal exudation, other than stellate, I have seen not infrequently in cases of large white kidney. My observation tallies with that of Dr. Gruening, that cases of contracted kidney are seen in private practice, while the large white kidneys are seen in the hospital.

DR. NOYES.—I should like to confirm the statements in regard to the relatively favorable prognosis of cases of retinitis albuminurica arising in connection with pregnancy or scarlet fever. This was well illustrated in a case brought to my office in which the patient had undergone all these conditions in the kidney, and yet recovered sight completely and lived for twelve years.

It is quite astonishing sometimes how much vision may improve without any alteration in the local appearances in the

retina and without any favorable change in the general condition, the improvement depending upon changes quite invisible to the naked eye.

I should like to make another observation to this effect, that within the past few years I remember to have seen a statement that an English observer in the out-patient department of one of the hospitals had examined all the cases of albuminuria admitted to that institution, and had found that in about sixty per cent. of the cases there was implication of the eye.

REMARKS ON PYOGENIC MICRO-ORGANISMS, WITH DEMONSTRATIONS AND EXPERIMENTS.

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DR. K. made some general remarks about the dependence of suppuration on certain kinds of micro-organisms, the pyogenic bacteria, of which pure cultures had been obtained during the last two years. He exhibited these bacteria in numerous test-tube specimens on agar-agar, further under the microscope, where also he showed microscopic slides of different tissues of the eye that had been infected with these germs. Then he showed two rabbits whose eyes he had operated on for cataract the day before, in the presence of members of the Society. Extraction had been made on the left eyes with clean instruments, on the right eyes with instruments contaminated with staphylococcus pyogenes aureus. The left eyes were free from secretion, the wound of the one in doubtful, of the other in good condition, whereas the right eyes discharged matter profusely, and were in a state of intense destructive inflammation. He then operated on two other rabbits, in the same way, before the Society. The four rabbits were exhibited again the next day and examined by the members of the Society. The right eyes in all were suppurating, the wounds of the left eyes in three of the rabbits were in good condition, in one of the first two